

# NOTES ON PROPAGATION AND CULTIVATION OF *ERYTHRINA* IN HAWAII<sup>1</sup>

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## ABSTRACT

Successful methods of propagation from seeds and by cuttings for *Erythrina* species are described. Species cultivated in the Waimea Arboretum, Haleiwa, Hawaii are listed, and information on their flowering periods is given.

*Erythrina* may be propagated easily from seeds, by cuttings or air layers, and probably also by grafting. In Hawaii, propagation from seeds and by cuttings are the most commonly used techniques.

## PROPAGATION FROM SEEDS

Fresh seeds and those harvested within 3–6 months of maturity can be sown without any special treatment. Germination rates are generally high and are often 100%. Seeds over 6 months old may take between 12 and 18 months to germinate due to their hard seed coat which becomes tougher with age. They need to be specially treated by one of the following methods to hasten and improve germination. They may be dropped into water which has just fallen below boiling point and left in the water as it cools for a minimum of one hour. If the seeds are three years old or more, they should be left to soak in the water for 10 to 12 hours and then sown in the usual way. As this method can kill the embryo if the seed coat is not very hard, it is preferable to file the seeds with a slender triangular file. A groove can be made through the sides of the seed coat with care so as to avoid damaging the cotyledons or embryo, which usually results in the death of the seeds from fungal attack or in malformed and weakened seedlings.

Seeds of most species produce strong seedlings from healthy seeds in almost any well-drained soil, with a minimum of trouble from damping-off disease. However, as it is difficult to obtain seeds of many of the rarer species, it is wise to use a partially sterilized soil and to add sand and peat. Some gravel, or cinder as is used in Hawaii, ensure drainage and rapid root growth. Air movement around the seedlings is beneficial.

A similar soil mixture, without sterilized soil, can be used for potting. The first potting of seedlings can be carried out when they are 5–8 cm high. Shade is essential for their survival during the first few days. Species successfully germinated are indicated in Table 1.

## PROPAGATION BY CUTTINGS

Propagation by cuttings can be rapid and successful depending on the species used, the time of propagation, and the maturity of the wood. At Waimea Ar-

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TABLE 1. Records of germination of seeds and/or propagation by cuttings of *Erythrina* at Waimea Arboretum, Haleiwa, Hawaii.<sup>a</sup>

(1) FROM SEEDS				
Name <sup>b</sup>	Collector	Date Sown & Quantity <sup>c</sup>	First Germination	Final Germination & Date Potted
13. <i>E. subumbrans</i> (74s1766)	From Matrimandir Gardens (India)	10/31/74 (6-H.W.)	1/1/75 (1 Germ.)	-----
36. <i>E. chiapasana</i> (74s861)	Krukoff 1973/16 (Guatemala)	6/21/74 (21-H.W.)	6/30/74 (3 Germ.)	7/8/74 (5 potted)
43. <i>E. guatemalensis</i> (74s874)	From same tree as Krukoff 1974/2 (Guatemala)	6/20/74 (5-H.W.)	7/8/74 (1 Germ.)	8/2/74 (1 potted)
49. <i>E. lanceolata</i> (75s2134)	Antonio Molina 1975/s.n. (Honduras)	11/3/75 (5-filed)	11/25/75 (5 Germ.)	11/25/75 (5 potted)
53. <i>E. berteroana</i> (74s864)	From same tree as Krukoff 1968/508 (Guatemala)	6/21/74 (36-H.W.)	7/11/74 (8 Germ.)	7/15/74 (11 potted)
59. <i>E. amazonica</i> (76s449)	N. T. Silva 4238 (Brazil)	4/15/76 (5-H.W.)	6/8/76 (1 Germ.)	6/21/76 (2 potted)
70. <i>E. oliviae</i> (77s330)	Joel Mejicanos 1977/1 (Mexico) (from same tree as type)	4/23/77 (13-filed)	5/5/77 (1 Germ.)	5/13/77 (12 potted)
85. <i>E. decora</i> (76s946)	W. Giess 1976/s.n. (S. West Africa)	10/27/76 (4-filed)	11/4/76 (1 Germ.)	11/17/76 (2 potted)
		10/27/76 (no treatment)	11/4/76 (1 Germ.)	11/17/76 (2 potted)
105. <i>E. burana</i> (74s884)	A. Getahum 1974/s.n. (Ethiopia)	6/20/74 (5-H.W.)	7/11/74 (1 Germ.)	7/23/74 (5 potted)
(2) FROM CUTTINGS				
Name	Collector	Date Inserted	Date & Number Potted	
26. <i>E. aff. coralloides</i> (74c1451)	Krukoff 1970/133 (Mexico)	9/20/74 (2-to mist) Rootone 'F' used	3/19/75 (2 potted)	
38. <i>E. cobanensis</i> (74c1453)	From same tree as Krukoff 1969/195 (Guatemala)	9/20/74 (3-to mist) 10/25/74 (1-to mist) both rec'd. Rootone 'F'	10/16/74 (1 potted) 7/2/75 (1 potted)	
40. <i>E. tajumulcensis</i> (74c1448)	From same tree as Krukoff 1969/249 (Guatemala)	9/20/74 (4-to mist) 10/16/74 (4-to mist) both rec'd. Rootone 'F'	Died 10/16/74 (4 potted)	
43. <i>E. guatemalensis</i> (74s874)	Krukoff 1974/2 (Guatemala)	12/10/74 (2-to mist) Rootone 'F' used	6/2/75 (1 potted)	

<sup>a</sup> All propagated material used in this experiment was originally received as seeds and identified by B. A. Krukoff (except for *E. subumbrans*).

<sup>b</sup> Waimea Arboretum accession numbers follow the names.

<sup>c</sup> H.W.—stands for Hot Water Treatment, and the preceding number stands for the number of seeds or cuttings used.

boretum we have had the poorest results from soft tips, and short, soft, side-shoots under mist propagation. However, terminal or side-shoots from mature wood usually give satisfactory results under intermittent mist or in a shaded propagating bed where they are misted manually two or three times a day.

The best medium is coarse sand or one with a high proportion of coarse sand. The addition of other materials has shown little benefit, and an abundance of peat or vermiculite has given poor results. Some workers have reported good results with pure perlite, but we have not found this to be so. The roots of plants from a sand medium tend to be tough and to suffer less during transplanting.

The best wood to use is fully matured, firm branch ends or short side growths, 20–25 cm long. We have had excellent results with these when they have been taken at the end of the growing season or just as the new growth begins in the spring.

We have found that any well-drained mixture can be used for potting, and that the application of a slow release fertilizer a few weeks after potting is beneficial. It is important to keep the roots from becoming pot-bound by repotting when necessary. Some species are particularly adverse to crowded root conditions and take a long time to establish a strong root system after they are planted out. Plants which are about 6 dm high from 1 gallon pots will grow well in the ground and there is no advantage in using larger containers. During the growing season the plants need plenty of water and can be fed at regular intervals with any balanced fertilizer. Species successfully propagated by cuttings are indicated in Table 1.

#### CULTIVATED SPECIES IN HAWAII

An extensive collection of *Erythrina* species has now been established in cultivation at Waimea Arboretum, Haleiwa, Hawaii. As of October, 1978, 71 species and 1 named hybrid had been successfully established. The following 23 species have been identified by B. A. Krukoff after having flowered at Waimea:

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|---|---|
| 1. <i>E. fusca</i> Loureiro                       | 49. <i>E. lanceolata</i> Standley           |
| 2. <i>E. crista-galli</i> L.                      | 50. <i>E. costaricensis</i> M. Micheli      |
| 4. <i>E. dominguezii</i> Hassler                  | 53. <i>E. berteriana</i> Urban              |
| 13. <i>E. subumbrans</i> (Hasskarl) Merrill       | 54. <i>E. rubrinervia</i> H.B.K.            |
| 16. <i>E. speciosa</i> Andrews                    | 56. <i>E. salviiflora</i> Krukoff & Barneby |
| 22a. <i>E. herbacea</i> L. subsp. <i>herbacea</i> | 59. <i>E. amazonica</i> Krukoff             |
| 26. <i>E. aff. coralloides</i> A. DC.             | 72. <i>E. lysistemmon</i> Hutchinson        |
| 36. <i>E. chiapasana</i> Krukoff                  | 73. <i>E. humeana</i> Sprengel              |
| 37. <i>E. atitlanensis</i> Krukoff & Barneby      | 94. <i>E. latissima</i> E. Meyer            |
| 40. <i>E. tajumulcensis</i> Krukoff & Barneby     | 96. <i>E. variegata</i> L.                  |
| 42. <i>E. macrophylla</i> A. DC.                  | 97. <i>E. tahitensis</i> Nadeau             |
| 43. <i>E. guatemalensis</i> Krukoff               |   |

An additional 40 named species, one named hybrid and 8 unidentified erythrinans remain to be identified and/or their names checked once they will be in flower.

Initial observations of the flowering periods of some *Erythrina* species have now been made and are presented in Table 2.

TABLE 2. Observations on flowering periods<sup>a</sup> of some *Erythrina* species at Waimea.<sup>b</sup>

1. <i>E. fusca</i> Loureiro (74s99)	Feb. 1977; Mar. 1977.
1. <i>E. fusca</i> Loureiro (74s1768)*	Feb. 1977.
2. <i>E. crista-galli</i> L. (74p840)	Apr. 1977; May 1978.
13. <i>E. subumbrans</i> (Hasskarl.) Merrill (74s1766)	Feb. 1977; Jan.–Feb. 1978.
16. <i>E. speciosa</i> Andrews (74s853)	Dec. 1976; Dec. 1977.
16. <i>E. speciosa</i> Andrews (74s856)	Dec. 1976; Jan. 1977; Jan.–Feb. 1978.
22A. <i>E. herbacea</i> L. subsp. <i>herbacea</i> (75c1103)	Dec. 1976; Jan.–Mar. 1977; Apr.–May 1978.
22A. <i>E. herbacea</i> L. subsp. <i>herbacea</i> (76s187)*	Dec. 1976; Mar. 1977.
26. <i>E. aff. coralloides</i> A. DC. (74c1451)	May 1978.
36. <i>E. chiapasana</i> Krukoff (74s861)	Mar. 1977; Feb.–Mar. 1978.
37. <i>E. atitlanensis</i> Krukoff & Barneby (74s98)	Feb. 1978.
40. <i>E. tajumulcensis</i> Krukoff & Barneby (74c144)	Apr.–May 1978.
42. <i>E. macrophylla</i> A. DC. (74s97)	Dec. 1977.
42. <i>E. macrophylla</i> A. DC. (74s858)	Feb.–May 1978.
43. <i>E. guatemalensis</i> Krukoff (74s103)	Mar. 1977; Apr.–May 1978.
50. <i>E. costaricensis</i> M. Micheli (74c1450)	Jan.–Feb. 1978.
52. <i>E. americana</i> Miller (76c261)*	Feb. 1978.
53. <i>E. berteroana</i> Urban (74s854)	Feb. 1978.
53. <i>E. berteroana</i> Urban (74s862)	Apr.–May 1978.
53. <i>E. berteroana</i> Urban (74s864)	Mar. 1977; Apr.–May 1978.
54. <i>E. rubrinervia</i> H.B.K. (74p325)	Jan.–May 1978.
56. <i>E. salviiflora</i> Krukoff & Barneby (74s859)	Apr.–May 1978.
96. <i>E. variegata</i> L. (74s877)—“boninensis”—	Jan.–Feb. 1977; Jan.–Mar. 1978.
96. <i>E. variegata</i> L. (74s1249)—collected in Guam	Feb. 1978.
96. <i>E. variegata</i> L. (75c1173)—“phlebocarpa”—	Feb. 1978.
96. <i>E. variegata</i> L. (76c183)	Apr.–May 1978.

<sup>a</sup> The flowering period noted is not necessarily the *total* period of flowering in a given year. It is a record of actually noted flowering.

<sup>b</sup> The identifications of the above plants were checked by B. A. Krukoff with the exception of the three marked with asterisks.